

CLAIMS

What is claimed is:

1. A method for protecting a non-volatile memory device, the method comprising:
forming a non-volatile memory device comprising a polycide structure formed over a
5 non-conducting charge trapping layer; and
forming a protective layer over at least a portion of said polycide structure, said
protective layer being adapted to absorb electromagnetic wave energy having a wavelength
shorter than visible light.
2. The method according to claim 1 wherein said forming said protective layer
10 comprises forming an ultraviolet absorber.
3. The method according to claim 1 wherein said forming said protective layer
comprises forming a nitride layer.
4. The method according to claim 3 wherein said forming said nitride layer comprises
forming a silicon-rich silicon nitride alloy.
- 15 5. The method according to claim 4 wherein said forming said nitride layer comprises
forming a nitride layer comprising $\text{Si}_{3+x}\text{N}_4$, wherein $x > 0$.
6. The method according to claim 3 wherein said forming said nitride layer comprises
forming a hydrogenated silicon-rich silicon nitride alloy.
7. The method according to claim 3 wherein said forming said nitride layer comprises
20 forming an amorphous silicon-rich silicon nitride alloy.
8. The method according to claim 1 wherein said forming said protective layer
comprises forming a nitride layer with a thickness of 50-1000 Å.
9. The method according to claim 1 wherein said forming said protective layer
comprises forming a layer of resistive undoped polysilicon.

10. The method according to claim 9 wherein said forming said protective layer of undoped polysilicon comprises forming a layer with a resistivity of at least 1 G Ω .

11. The method according to claim 9 wherein said forming said protective layer of undoped polysilicon comprises forming a layer with a thickness of 30-600 Å.

5 12. The method according to claim 1 and further comprising forming at least one additional layer over said protective layer.

13. The method according to claim 12 wherein said forming said at least one additional layer comprises forming at least one of a layer of undoped glass, a layer of doped glass and a metal layer.

10 14. The method according to claim 12 and further comprising plasma etching said at least one additional layer with said protective layer masking at least a portion of said polycide structure.

15 15. The method according to claim 1 wherein said forming said non-volatile memory device comprises forming said non-volatile memory device with a polycide structure comprising a polysilicon layer and a metal silicide film.

16. A non-volatile memory device comprising:

a polycide structure formed over a non-conducting charge trapping layer; and

a protective layer formed over at least a portion of said polycide structure, said protective layer being adapted to absorb electromagnetic wave energy having a wavelength
20 shorter than visible light.

17. The device according to claim 16 wherein said protective layer comprises an ultraviolet absorber.

18. The device according to claim 16 wherein said protective layer comprises a nitride layer.

19. The device according to claim 18 wherein said nitride layer comprises a silicon-rich silicon nitride alloy.

20. The device according to claim 19 wherein said nitride layer comprises $\text{Si}_{3+x}\text{N}_4$, wherein $x > 0$.

5 21. The device according to claim 18 wherein said nitride layer comprises a hydrogenated silicon-rich silicon nitride alloy.

22. The device according to claim 18 wherein said nitride layer comprises an amorphous silicon-rich silicon nitride alloy.

10 23. The device according to claim 16 wherein said protective layer comprises a nitride layer with a thickness of 50-1000 Å.

24. The device according to claim 16 wherein said protective layer comprises a layer of resistive undoped polysilicon.

25. The device according to claim 24 wherein said protective layer of undoped polysilicon comprises a resistivity of at least 1 GΩ.

15 26. The device according to claim 24 wherein said protective layer of undoped polysilicon comprises a thickness of 30-600 Å.

27. The device according to claim 16 and further comprising at least one additional layer formed over said protective layer.

20 28. The device according to claim 27 wherein said at least one additional layer comprises at least one of a layer of undoped glass, a layer of doped glass, and a metal layer.

29. The device according to claim 16 wherein said polycide structure comprises a polysilicon layer and a metal silicide film.

30. The device according to claim 29 wherein said polysilicon layer comprises a polycrystalline silicon (polysilicon).

P-4007-US

31. The device according to claim 29 wherein said polysilicon layer is doped with a dopant.

32. The device according to claim 29 wherein said polysilicon layer is undoped.

33. The device according to claim 29 wherein said metal silicide film comprises at least
5 one of a tungsten silicide film and a titanium silicide film.

34. The device according to claim 16 wherein said non-volatile memory device comprises a nitride, read only memory (NROM) device, and said non-conducting charge trapping layer comprises a nitride charge trapping layer.

09080122-11901